DOCUMENT RESUME

ED 269 758 CS 209 668

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TITLE The Influence of Prior Knowledge on Process-Approach Writing Tasks.
PUB DATE [86]
NOTE 30p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Baseball; Content Analysis; Grade 4; Intermediate Grades; Peer Evaluation; *Prior Learning; Revision (Written Composition); Schemata (Cognition); Writing Instruction; *Writing Processes; *Writing Research
IDENTIFIERS Topic Selection

ABSTRACT

A study examined the influence of prior knowledge on the quality of responses in three process-approach tasks: writing, conferencing, and revising. Subjects, 20 high-knowledge and 20 low-knowledge fourth grade students, wrote stories about a baseball game. Propositional text bases of first and second drafts were analyzed according to six categories of baseball grammar (setting, state, action, auxiliary action, nongame relevant action, and nongame irrelevant action). Comments about baseball content made during peer conferences were coded using the same six categories. Differences in the content of first drafts, conference comments, and second drafts were found to be related to prior knowledge. Results tended to support the instructional recommendations of composition researchers that topics process-approach writing lessons be selected according to students' prior knowledge. (Author/HTH)

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The Influence of Prior Knowledge on Process-Approach Writing Tasks

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ABSTRACT

This study examined the influence of prior knowledge on the quality of responses in three process-approach tasks: writing, conferencing, and revising. Twenty high-knowledge and 20 low-knowledge fourth grade students wrote stories about a baseball game. Propositional text bases of first and second drafts were analyzed according to six categories of a baseball grammar (Voss et al., 1980). Comments about baseball content made during peer conferences were coded using the same six categories. Differences in the content of first drafts, conference comments, and second drafts were found to be related to prior knowledge. Results tend to support the instructional recommendations made by Calkins (1983, 1986) and Graves (1983) that topics in process-approach writing lessons be selected according to students' prior knowledge.

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In recent years, attention has turned to improving students' writing competency (Mellon, 1976; Purves, 1977). Among the various methods for teaching writing in the elementary grades (Flood & Salus, 1984; Moffett & Wagner, 1983; Shanklin, 1982), the "process approach" described by Graves (1983) and Calkins (1983, 1986) has received the greatest attention (Barrs, 1983).

Process-approach instruction emphasizes writers' acts rather than products (Calkins, 1983; Graves, 1983, 1986). This approach requires that students' engage in tasks derived from models of mature writers' processes (Emig, 1971; Murray, 1982; Smith, 1982). For example, selecting topics on the basis of students' prior knowledge is a fundamental feature of process-approach lessons described by Graves and Calkins. Students are encouraged to write about their personal experiences or vicarious experiences established through reading. After selecting topics, students write first drafts of their stories. During or after the first draft, writers share their work in conferences with peers or a teacher. Revision that leads to second or further drafts is emphasized as part of the writing process.

While the importance of prior knowledge in writing has been recognized (Calkins, 1983; Graves, 1983; Hayes & Flower, 1980; Moffett & Wagner, 1983), little is known about how prior knowledge influences performance on process-approach tasks. Several naturalistic studies have described topic selection, writing, conferencing,

and revising in classroom settings (Avery, 1985; Church, 1985; Hansen, 1983; Hink, 1985; Salo-Miller, 1984). These naturalistic studies focus on a child, a group of children, or a classroom using a process approach. For example, Avery tells how a first grade child is encouraged to write stories on topics related to her summer experiences and literature read in the classroom. Church describes how shared knowledge of a topic becomes the focus for writing sessions with a group of three middle school boys. Hansen defines four ways children respond to the writing of peers in one first grade classroom. Six types of revision, as they occur in a second grade classroom using a process approach, are identified by Hink. Salo-Miller illustrates the process approach in a fourth grade classroom. She explains how writing topics associated with students' prior knowledge are generated, and how conferencing and revision take place.

While the naturalistic studies (Avery, 1985; Church, 1985; Hansen, 1983; Hink, 1985; Salo-Miller, 1984) illustrate attention to prior knowledge in process-approach lessons, they do not explain how prior knowledge influences performance on writing tasks. In order to determine empirically that prior knowledge is related to performance, it is necessary to begin by defining knowledge of a particular domain (Mosenthal, 1982; Mosenthal, 1984). After arriving at a definition,

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students' prior knowledge can be assessed and their writing and conversation examined in relation to their levels of knowledge. Students in naturalistic studies often are writing on topics drawn from various knowledge domains which are left undefined. Therefore the link between what students know and what they write and say is at best tenuously established.

Two empirical studies have indicated that prior knowledge is related to the quality of secondary school students' writing (Chesky, 1984; Langer, 1984). Chesky found that prior knowledge rather than awareness of audience was related to measures of quality for papers written about tobacco price support and problems with teachers. Langer identified constructs presented in history lessons and determined that students with well developed constructs wrote essays on those topics that were similarly well developed.

Application of Chesky's (1984) and Langer's (1984) findings to an understanding of prior knowledge in elementary school process-approach lessons is limited in several ways. First, both studies involved secondary school rather than elementary school students as subjects. Second, while topics were identified, knowledge domains were not clearly defined. Chesky assumed that students had greater knowledge of problems with teachers than of tobacco price supports. Consequently, students' papers were assessed with measures which did not identify how information from a

domain was represented in their written texts. Langer examined the degree to which information on a topic was integrated. Essays were then evaluated using measures which Langer suggests reflect integration of knowledge in written texts. Finally, both the Chesky and Langer studies evaluated only first drafts of writing. How prior knowledge influenced conference conversation about those drafts was not considered. As the students did not revise with the intent of creating further drafts, the relationship of prior knowledge to the quality of second drafts was also unexplored.

One study, in particular, illustrates how prior knowledge is related to the quality of writing within a specified domain (Voss, Vesonder, & Spilich, 1980). Using Spilich, Vesonder, Chiesi, and Voss's (1979) definition of baseball knowledge, Voss et al. developed a predictive grammar for analyzing baseball texts. The grammar consists of six categories: (1) setting, (2) state, (3) action, (4) auxiliary action, (5) nongame relevant action, and (6) nongame irrelevant action. While each category represents information within the domain of a baseball game, only information in the state, action, and auxiliary action categories pertain to the goals of the game and how to achieve them. State describes current values of goal structure variables. For example, the number of runs, and the strike-ball count are states. Action refers to what players in the

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game do to change states. Throwing a pitch, running to a base, and catching a fly ball are all actions. Auxiliary action describes events leading to actions. That is, auxiliary actions do not directly produce changes in states but rather lead to actions that change states. Hitting a ground ball to third base and throwing a ball directly to the shortstop are examples of auxiliary actions. Setting and nongame relevant action both pertain to the game but do not describe the goals of the game or how to attain them. Setting tells about the teams, players, and location of the game. Nongame relevant actions describe those things players do which fail to effect changes in states. Stepping up to bat and talking to other players are examples of nongame relevant actions. Nongame irrelevant actions describe the activities of people, other than players, in attendance at a game.

In order to determine how writers' prior knowledge was related to the quality of their stories, Voss et al. (1980) began by administering a short answer test of baseball knowledge to adult subjects. High- and low-knowledge subjects then wrote stories about a half inning of a game. After delineating the propositional structure of each story using Turner and Greene's (1977) system, propositions were coded with the baseball grammar.

Voss et al. (1980) found that greater proportions of auxiliary action propositions were produced by high-

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knowledge writers; nongame irrelevant action propositions by low-knowledge writers. According to Voss et al., these results indicated qualitative differences in texts related to writers' prior knowledge. Quality of content was reflected in high-knowledge writers' texts by inclusion of information about how to achieve the goals of the game, whereas low-knowledge writers emphasized actions unrelated to game goals.

Two studies have used Voss et al.'s (1980) procedures in examining prior knowledge in the writing of elementary school students. Mosenthal (1984) and Mosenthal, Conley, Colella, & Davidson-Mosenthal (1985) found prior knowledge was related to the quality of fourth grade students' baseball narratives. However, the findings of these studies are limited in application to process-approach lessons in two ways. First, students in both studies wrote stories about a half inning of a baseball game while using picture prompts. The use of prompts in writing tasks is not a feature of process-approach lessons described by Graves (1983) and Calkins (1983, 1986). Second, as in the previously cited empirical studies, the effects of prior knowledge on conferencing and writing second drafts were not considered.

How then might prior knowledge of baseball be related to what elementary students write and say during

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process-approach tasks? It might be imagined that in a classroom lesson some students would write stories about an interesting part of a baseball game. Students would write first drafts and then arrange to talk about their drafts with other students. During peer conferences, students would comment on the content of the stories, noting important parts of the stories, and suggesting information that might be added or deleted. After conferencing, writers would return to their stories and revise, perhaps using some of the suggestions arising from the conferences.

According to Voss et al. (1980), it might be expected that high-knowledge writers' first and second drafts would contain information related to an understanding of the goals of the game and how to achieve them. Low-knowledge writers' drafts would contain information unrelated to game goals. Likewise, it might be expected that in the intervening conferences, high-knowledge participants would comment on goal related information, whereas low-knowledge participants would talk about nongoal information.

The purpose of the following study was to test empirically the relationship between elementary school students' prior knowledge of baseball and their performance on writing first drafts, conferencing with peers about their drafts, and revising to create second drafts of their baseball narratives.

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Methods

Subjects

Fourth grade students from a suburban school participated in this study. Data were collected during October when the school was beginning the third year of process-approach instruction. Ninety-five students were tested for conferencing ability and baseball knowledge in their classrooms by the experimenter. A 20 item true-false test of conferencing ability was designed to reflect understanding of appropriate conferencing behavior as described by Graves (1983) and Calkins (1983). Twenty-seven students were not considered as potential subjects because they failed to meet the criterion of 75 percent correct responses on this test.

Following the procedures of Voss et al. (1980), a 49 item short answer test of baseball knowledge, used in two previous studies (Mosenthal, 1984; Mosenthal et., 1985), was administered to identify high-knowledge and low-knowledge subjects. Twenty high-knowledge subjects, 17 boys and three girls; and 20 low-knowledge subjects, five boys and 15 girls, were selected as subjects.

To assure that analysis of the quality of students' texts reflected their prior knowledge rather than overall writing achievement, teacher ratings of writing achievement and percentile rank scores on the CTBS (Comprehensive Tests of Basic Skills, 1981) were compared with students' levels of prior knowledge. No significant relationship ($p < .05$) was found between

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baseball knowledge and teacher rating (r = .15). Likewise, no significant relationships were found between baseball knowledge and the scores on the Total Language (r = .27), Mechanics (r = .23), and Expression (r = .16) subtests of the CTBS. Thus, it was thought that further analysis of the students' writing would reflect their knowledge of baseball rather than general writing achievement.

Procedures

All 40 subjects participated as writers and as respondents in peer conferences with order of participation balanced. Writing and conferencing were carried out under the supervision of the experimenter in a room outside the students' classrooms.

Students were instructed to write first drafts of a story about a half inning of a baseball game. Peer conferences, which took place one or two days following the writing of first drafts, were formed by randomly assigning students to pairs representing all possible combinations of writer-respondent baseball knowledge. Writers were told to start conferences by reading their entire first drafts aloud. Conference participants were directed to talk about the meaning of the story rather than spelling, handwriting, or punctuation. Following the conferences, which were audio-recorded, writers were instructed to write second drafts of their stories. They had available copies of their first drafts with

whatever notes were made during conferencing. Students were made aware of all procedures at the start of the experiment and were given unlimited time to perform all tasks.

Data analysis

Scoring first and second drafts. A propositional text base for each draft was defined using Turner and Greene's (1979) procedures. Propositions were then coded according to the six categories of Voss et al.'s (1980) baseball grammar (setting, state, action, auxiliary action, nongame relevant action, nongame irrelevant action).

All drafts were first analyzed by the experimenter. A second rater analyzed a sample of 10 of the first drafts. To determine reliability for defining and coding propositions, locations of agreements and disagreements between the two raters were noted. The number of agreements was divided by the sum of the agreements and disagreements to produce a reliability quotient. This procedure yielded inter-rater reliabilities of 95 percent for both defining and coding propositions with the baseball grammar.

To determine the relationship between prior knowledge and the quality of the content of students' first and second drafts, analyses of the content were conducted using proportions of propositions. Proportions were created by dividing the frequency of propositions at each of the six categories of the

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baseball grammar by the total number of propositions in a draft.

To determine the relationship between prior knowledge and the changes students made from first to second drafts, the absolute value of the differences in frequencies of propositions between drafts for each of the six baseball categories was divided by the total number of changes for a draft. Absolute values were used in order to assess the effects of both addition and deletion revisions.

Scoring peer conferences. Utterances, the complete text spoken at one time by either conference participant, were separated into initiations and responses. Initiations were indicated by the introduction of a new topic. Extensions, elaborations, corrections, clarifications, evaluations, or confirmations of topics introduced in initiations were considered to be responses. Two raters parsed all 40 conference transcripts into initiations and responses. Disagreements in parsing were settled through discussion.

Topics of initiations and responses were then recorded and sorted into four major categories: content, evaluation, process, and form. The content category, representing conversation about the game of baseball, was the focus of subsequent analysis of the relationship between prior knowledge and what students said during

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conferences.

Content initiations and responses were coded using the six categories of Voss et al.'s (1980) baseball grammar. A seventh category was created in addition to setting, state, action, auxiliary action, nongame relevant action, and nongame irrelevant action. The seventh or general category captured references to the total story or game without attention to game goals.

All 40 conferences were first coded by the experimenter. To establish reliability, a second rater coded a sample of 10 conference transcripts. Agreements and disagreements were identified. A reliability quotient of 74 percent was determined by dividing the number of argreements by the sum of the agreements and disagreements.

To determine the relationship between prior knowledge and the what students' said about the content of stories, analyses were conducted using proportions of comments (initiations and responses combined). Proportions were created by dividing the frequencies of setting, state, action, auxiliary action, nongame relevant action, nongame irrelevant action, or general content comments by the total number of content comments.

Results

It was hypothesized, based on the explanations of Voss et al. (1980), Mosenthal (1984), and Mosenthal et al. (1985), that the content of students' first drafts

of stories would reflect differences in their prior knowledge of baseball. This prediction was confirmed. Using six one-way ANOVAs with two levels of prior knowledge, it was found that high-knowledge students produced a significantly greater mean proportion of auxiliary action propositions than did low-knowledge students, $F(df = 1,39) = 19.60$, $p<.0001$ (see table 1). On the other hand, low-knowledge students produced a significantly greater mean proportion of nongame relevant action propositions than did high-knowledge students, $F(df = 1,39) = 4.87$, $p<.05$.

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INSERT TABLE 1 ABOUT HERE

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It was also hypothesized that students' comments during peer conferences would be associated with their levels of prior knowledge. High-knowledge students would comment about goal-related content, that is, state, action or auxiliary action information. Likewise, low-knowledge students would comment about information unrelated to the goals of the game. In addition to setting, nongame relevant action and nongame irrelevant action information, the general information category was defined as being nongoal related.

Using a 2 x 2 (writer knowledge x respondent knowledge) analysis of variance design, the influence of

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prior knowledge was determined in view of each conference participant's level of knowledge. A significantly greater mean proportion of state comments, $F(1,37) = 6.16$, $p<.05$, was found to be associated with the conferences including high-knowledge respondents (see table 2). Conferences with low-knowledge writers generated a significantly greater mean proportion of general content comments, $F(1,37) = 8.90$, $p<.01$.

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INSERT TABLE 2 ABOUT HERE

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It was further hypothesized that differences in the content of students' second drafts would be related to prior knowledge. One explanation for this difference was based on Voss et al.'s (1980), Mosenthal's (1982), and Mosenthal et al.'s (1985) findings that writer knowledge influences text content. A second explanation that the respondents' prior knowledge would influence second draft content was also considered. Results support the former explanation. Writer knowledge continued to be related to differences in the proportions of auxiliary action propositions in the second drafts as in the first drafts. Six 2 x 2 ANOVAs (writer knowledge x respondent knowledge) were run. High-knowledge writers produced a significantly greater mean proportion of auxiliary action propositions than did low-knowledge writers, $F(1,37) = 23.76$, $p<.0001$ (see

table 3).

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Last, it was hypothesized that the changes made between first and second drafts would be related to students' prior knowledge. Again, explanations for the influence of writer or respondent knowledge were considered; results support the former explanation.

Continuing with the same analysis of variance design, it was found that high-knowledge writers made a significantly greater mean proportion of changes in auxiliary action propositions than did low-knowledge writers, $F(1,37) = 6.68$, $p<.05$ (see table 4). High-knowledge writers increased the proportion of auxiliary action propositions as they moved from first ($M = .18$) to second ($M = .21$) drafts.

Low-knowledge writers made a significantly greater mean proportion of changes in nongame relevant action propositions than did high-knowledge writers, $F(1,37) = 10.42$, $p<.01$. Low-knowledge writers decreased the proportion of nongame relevant action propositions from first ($M = .27$) to second ($M = .23$) drafts.

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INSERT TABLE 4 ABOUT HERE

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Discussion

The purpose of this study was to determine the influence of students' prior knowledge on process-approach tasks: writing, conferencing, and revising. The results suggest that prior knowledge is a significant factor in all phases of process-approach lessons. Level of knowledge was significantly related to differences in content in students' first baseball story drafts. High-knowledge writers' first drafts were characterized by the inclusion of auxiliary action information. In this case, the drafts referred more often to detailed events which lead to actions that produced changes in game states. Low-knowledge students' wrote first drafts characterized by nongame relevant action information such as players' conversations, altercations, or accidents.

Prior knowledge also was related to differences in the quality of content comments that students made during peer conferences. Conferences with high-knowledge respondents had significantly greater proportions of comments about the state of the game; for example, they kept track of changes in the score, strike-ball count and baserunners' locations. On the other hand, conferences with low-knowledge writers had more comments about the game in general, referring to the game or the story as a whole.

As with the first drafts, writer's high-knowledge was found to be related to the proportion of auxiliary

actions in second drafts. However, high- and low-knowledge writers' drafts no longer differed in proportions of nongame relevant action information. No differences in the content of the second drafts were found to be related to the respondents' level of prior knowledge.

In addition, comparisons of first and second drafts indicated that writers' prior knowledge was related to the category of information which writers revised. High-knowledge writers more often revised in the auxiliary action category than did low-knowledge writers. Their revising increased the proportion of auxiliary actions in the second drafts. Low-knowledge writers made significant decreases in nongame relevant actions in their second drafts.

The findings suggest that prior-knowledge determines in part what students write in first drafts, what they say during peer conferences, and how they revise when writing second drafts of stories. Ideally, if topics are selected on the basis of prior knowledge as recommended by Graves (1983) and Calkins (1983, 1986), all writers in process-approach lessons will be knowledgeable of their topics. This desired state would contribute to the writing of stories which include information that is valued within a specified knowledge domain.

It also appears that it may be beneficial to have

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high-knowledge students participate as respondents in what Calkins (1983, 1986) calls content conferences. According to Calkins, the purpose of content conferences is to help writers focus on important information in their texts. Respondents help writers to expand or clarify where necessary or to edit out information which is irrelevant to a topic. In this study, high-knowledge respondents more often kept track of the the state of the game than did low-knowledge respondents. For example, a high-knowledge respondent points to a need for more information about the status of outs by saying, "It can't be the end of the inning. You've only got two outs in your story." Another knowledgeable respondent noted confusion in information about the location of baserunners and said, "You just said he got to second base but you've already got a guy on second base. There can't be two guys on the same base."

Other investigations have indicated that students do focus on the content of texts during conferences (Crowhurst, 1979; Abbott & Gere, 1985). The present study corroborates those findings. Students were told to talk about meaning rather than mechanics; 52 percent of their initiations and responses did refer to baseball content.

Do writers, however, use content comments like those above when they revise? While this study did not seek to answer this question by examining connections between specific comments and revisions, findings

indicate that writer knowledge rather than respondent knowledge influences revision. The suggestion is that students write about what they know rather than about what others say to them. Church (1985) came to a similar conclusion in a study of writing and conferencing in the middle school. In that study, Church found that recommendations made during conferences did not necessarily lead to changes in subsequent drafts of students' texts. Future studies need to determine how skilled writers make use of responses to their texts and how teachers can help students to develop the same proficiency.

In summary, this study supports the recommendations of Graves (1983) and Calkins (1983, 1986) that knowledge of a topic is an important consideration in writing lessons. Prior knowledge has influence on the types of information included in drafts of stories and discussed in peer conferences.

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Table 1

Proportions of Propositions by High- and Low-Knowledge Subjects on First Drafts[a]

		Writer Knowledge		
		High		Low
Setting	M	.15		.15
	SD	.15		.12
	F[b]		0.02	
State	M	.23		.21
	SD	.17		.16
	F		0.19	
Action	M	.24		.29
	SD	.12		.20
	F		0.92	
Auxiliary Action	M	.18		.02
	SD	.15		.04
	F		19.60 **	
Nongame Relevant Action	M	.16		.27
	SD	.11		.19
	F		4.87 *	
Nongame Irrelevant Action	M	.03		.05
	SD	.13		.10
	F		0.12	

[a] All n's = 20.

[b] All df = 1, 39.

*$p < .05$.

**$p < .0001$.

Table 2

Proportions of Content Comments by High- and Low-Knowledge Subjects During Conferences[a]

		Writer Knowledge		Respondent Knowledge	
		High	Low	High	Low
Setting	M	.25	.14	.14	.25
	SD	.31	.17	.20	.30
	F[b]	1.79		2.05	
State	M	.12	.05	.15	.02
	SD	.21	.11	.22	.07
	F	1.98		6.16 *	
Action	M	.10	.05	.08	.13
	SD	.14	.09	.07	.12
	F	1.28		0.03	
Auxiliary Action	M	.06	.003	.06	.004
	SD	.16	.01	.16	.01
	F	2.68		2.56	
Nongame Relevant Action	M	.03	.09	.05	.07
	SD	.06	.18	.10	.16
	F	2.05		0.20	
Nongame Irrelevant Action	M	.05	.02	.05	.02
	SD	.21	.06	.21	.07
	F	0.24		0.28	
General	M	.34	.63	.47	.50
	SD	.26	.34	.35	.32
	F	8.90 **		0.10	

[a] All n's = 20.
[b] All df = 1,37.
*p<.05.
**p<.01.

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Table 3

Proportions of Propositions by High- and Low-Knowledge Subjects on Second Drafts[a]

		Writer Knowledge		Respondent Knowledge	
		High	Low	High	Low
Setting	M	.13	.16	.16	.14
	SD	.14	.12	.15	.11
	F[b]	0.46		0.28	
State	M	.21	.17	.20	.18
	SD	.14	.16	.15	.16
	F	0.68		0.17	
Action	M	.22	.33	.27	.28
	SD	.16	.21	.16	.23
	F	3.39		0.02	
Auxiliary Action	M	.21	.03	.10	.15
	SD	.15	.07	.13	.15
	F	23.76 *		1.86	
Nongame Relevant Action	M	.17	.23	.19	.21
	SD	.12	.21	.19	.15
	F	1.17		0.10	
Nongame Irrelevant Action	M	.05	.07	.07	.15
	SD	.15	.10	.04	.09
	F	0.19		0.59	

[a] All n's = 20.

[b] All df = 1,37.

*p < .0001.

Table 4

Proportions of Changes Between Drafts by High- and Low-Knowledge Subjects[a]

		Writer Knowledge		Respondent Knowledge	
		High	Low	High	Low
Setting	M	.11	.09	.09	.11
	SD	.13	.12	.10	.14
	F[b]	0.31		0.03	
State	M	.22	.17	.23	.16
	SD	.24	.16	.19	.21
	F	0.63		1.06	
Action	M	.23	.31	.27	.27
	SD	.20	.24	.20	.25
	F	1.14		0.00	
Auxiliary Action	M	.25	.07	.13	.19
	SD	.30	.11	.24	.18
	F	6.68 *		0.52	
Nongame Relevant Action	M	.07	.26	.18	.15
	SD	.09	.24	.23	.18
	F	10.42 **		0.31	
Nongame Irrelevant Action	M	.05	.10	.08	.07
	SD	.14	.17	.15	.16
	F	0.96		0.07	

[a] All n's = 20.

[b] All df = 1,37.

*$p < .05$.

**$p < .01$.